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MINIATURIZED GC/MS INSTRUMENTATION FOR SPACEFLIGHT APPLICATIONS

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Abstract

A new generation of miniaturized chemical instruments will be needed for spaceflight applications where factors such as reduction in payload requirements and enhanced robustness are important. In response to this need, we are developing miniaturized GC/MS instrumentation which combines fast chemical separations by gas chromatography (GC) with mass spectrometry (MS) to provide positive identification of chemical compounds from analysis of their ion fragments. Our design approach utilizes MEMS-based gas chromatography components coupled with a miniature quadrupole array mass spectrometer. Key design issues include low power, robustness, low flow rates to minimize vacuum pumping requirements, and the use of a modular design approach to provide flexibility for different planetary atmospheres and other applications. Among the potential applications for such instrumentation are scientific measurements in unmanned planetary missions and environmental monitoring of space habitats.

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